

**PRELIMINARY ASSESSMENT
OF
Zero (0) E. Basin Road Site**

**PFOS & PFOA
Impacted Public Wells in New Castle, Delaware**

**DELAWARE DEPARTMENT OF
NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL**



DE-0363

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5.3 Groundwater Targets and Pathways

DNREC centered the seven (7) square mile AOI on the PFC impacted public supply wells and extended the boundary of the AOI out to include potential areas of concern such as industrial parks. Within the AOI, there are eight (8) Wellhead Water Resource Protection Areas (WHPAs) and four (4) groundwater recharge areas (Figure 33).

According to the DNREC-Water Supply Section GIS layer based on the Delaware Water Use Data System (DEWUDS) database, there are fourteen (14) active “public” supply wells within the AOI. Of the fourteen (14) public wells, three (3) are allocated to the City of New Castle and eleven (11) are allocated to the Artesian Water Company. Artesian Water Company provides service at approximately 6,000 commercial and/or residential metered connections within the AOI while the City of New Castle provides service to approximately 2,200 commercial and/or residential metered connections within the AOI. The fourteen (14) public wells produce water either from the Columbia, the Columbia-Potomac, or the Potomac Aquifers. Seven (7) of the public wells are located within or in close proximity to the paleo-channel mentioned above as shown in Figures 29, and 30.

In addition to the public wells, there are approximately 887 permits for wells within the AOI including agriculture, dewatering, geothermal, monitor, observation, and other standard wells (Figure 34).

There was an initial concern from both DNREC and EPA that there might be domestic wells in use within a 5-mile radius around the Delaware Air National Guard. With the cooperation of DNREC, EPA, Artesian, and the City of New Castle, all of the parcels with suspected permitted domestic wells within the AOI were verified to be either on public water or located incorrectly (Figure 35). The one (1) parcel with a verified residential well that was still in use was located northwest of the airport along the Christina River, which is outside of the current AOI. EPA sampled this domestic well and PFCs were not detected in the sample.

5.4 Existing Groundwater Data

As part of the federal Unregulated Contaminant Monitoring Rule 3 (UCMR3), Artesian sampled for the presence of an EPA selected group of 28 unregulated drinking water contaminants in its public supply wells within the AOI. Every five years, the EPA conducts a national study of the amounts of certain contaminants that may be found in public drinking water. The goal is to determine whether those contaminants should be added to the list of chemicals regulated under the Safe Drinking Water Act. PFOA and PFOS are part of the study.

On June 2, 2014, Artesian received notice that the samples collected on July 17, 2013 and January 28, 2014 from the Wilmington Manor 3 Treatment Plant and the Jefferson Farms No. 1 well exceeded the Federal provisional health advisory for PFOS of 0.2 ppb (parts per billion). Artesian then removed the wells from service until appropriate treatment can be installed. PFOA was also detected in these samples, but at levels less than the provisional health advisory for PFOA. The public notice for the Wilmington Manor 3 facility was issued on June 12, 2014 and both the Wilmington Manor 3 and the Jefferson Farms 1 wells were removed from service. A copy of the public notice is included in

Appendix 1 and can also be found at

<http://www.dhss.delaware.gov/dhss/dph/hsp/alerts/artesianwatercopfos061214.html>.



In addition to the wells within the AOI, Artesian also sampled four (4) other systems located north and south of the AOI. The systems include: Llangollen, Collins Park, Castle Hills, and Midvale. The Midvale, Llangollen, Castle Hills, and Collins Park wells all contained PFOA with concentrations above detection levels but below the provisional health advisory. None of the wells at Llangollen, Collins Park, Castle Hills, or Midvale had detectable concentrations of PFOS.

The provisional health advisory for PFOS was exceeded in samples collected from the City of New Castle Frenchtown Road, Schoolhouse Lane, and Basin Road public supply wells on July 9, 2014. Although PFOA was detected in the samples from all three (3) wells, the provisional health advisory for PFOA was exceeded in only the Basin Road and Frenchtown Road wells. The public notice for the City of New Castle wells was issued on August 19, 2014, and all three (3) wells were removed from service. A copy of the public notice is included in Appendix 3 and can also be found at <http://www.dhss.delaware.gov/dhss/dph/hsp/alerts/newcastlepfos081914.html>

The table below reports only the exceedances for groundwater samples collected from public wells. Results colored in light grey are positive results below the provisional health advisory. Results in yellow exceed the provisional health advisory. Table 5 summarizes results for all the public well sampling events to date. A summary of well construction details are in Table 7.

Facility Name/Site	Well Number	DNREC Permit	Sample Date	PFOA ug/l	PFOS ug/l
Provisional Health Advisory				0.4 ug/l	0.2 ug/l
Artesian Wells within AOI					
Jefferson Farms	Well-1	237552	6/12/2014	0.05	0.20
Jefferson Farms	Well-1	237552	7/14/2014	0.07	0.36
Jefferson Farms	Well-1	237552	8/14/2014	0.08	0.59
Wilmington Manor	Well-3	10041	7/1/2013	0.14	0.93
Wilmington Manor	Well-3	10041	1/14/2014	0.14	1.80
City of New Castle Wells					
Frenchtown Road	Well-1	35665	7/9/2014	0.94	0.82
Schoolhouse Lane	Well-1	00137	7/9/2014	0.13	0.91
Basin Road	Well-1	10060	7/9/2014	0.44	2.30

Offline due to PFC Contamination

In August 2014, the environmental consultants for both DNREC-SIRS and EPA sampled select monitor wells on the Delaware Air National Guard and the New Castle County Airport for PFCs.

In September 2014, five (5) monitor wells on the Harry Woods Landfill Site were sampled and analyzed for the suite of PFC compounds. The analytical results indicated the presence of both PFOS and PFOA in the samples but only PFOS exceeded the threshold of 0.2ppb in four of the five wells. Even though these samples exceed the EPA threshold for PFOS, all the results were less than PFOS results in the New Castle Frenchtown well located up gradient of the landfill. PFOS was detected in the Frenchtown well at 0.9ppb. Therefore, the landfill is presumed not to be the source of PFCs. According to the project manager, the



monitor wells at the Harry Wood landfill detected PFCs after the public wells were turned off, allowing the contaminant to continue down gradient into the wells at Harry Wood.

Six (6) of the seven (7) monitor wells sampled on the Delaware Air National Guard exceeded the provisional health advisory for PFOS while only three (3) of the wells exceeded the provisional health advisory for PFOA. [Figures 36, 36A, 36B, and 36C](#) show the locations of all the public supply and monitor wells that have been sampled.

The table below reports only the exceedances for groundwater samples collected from monitor wells. Results colored in light grey are positive results below the provisional health advisory. Results in yellow exceed the provisional health advisory. [Table 6](#) summarizes all the monitor well sampling events to date. A summary of well construction details are presented in [Table 7](#).

Facility Name/Site	Well Number	DNREC Permit	Sample Date	PFOA ug/l	PFOS ug/l
Provisional Health Advisory				0.4 ug/l	0.2 ug/l
DANG Wells					
DANG	MW-107	NA	8/13/2014	0.59	5.98
DANG	MWR-130S	95151	8/13/2014	0.19	2.00
DANG	MWR-145	NA	8/13/2014	0.42	2.10
DANG	MWR-147S	98527	8/13/2014	0.19	2.84
DANG	MW-316	NA	8/13/2014	0.45	7.90
DANG	MW-318	208357	8/13/2014	0.36	0.55
DNREC Wells at NCC AIRPORT					
DNREC-SIRS	NCCAMW-01	240700	8/18/2014	0.0641	0.268
Harry Wood Landfill					
Harry Wood	MW-2	181215	9/30/2014	0.15	0.18
Harry Wood	MW-4S	235121	9/30/2014	0.13	0.36
Harry Wood	MW-4D	235083	9/30/2014	0.076	0.34
Harry Wood	MW-5	235084	10/1/2014	0.23	0.76

6.0 SURFACE WATER AND SEDIMENT PATHWAY

6.1 Hydrologic Setting

The Area of Interest is located between the Christina River and I-95 to the northwest, I-295 to the north, Rt9 and the Delaware River to the east, Army Creek to the south and Rt37, Rt273 and Rt13 to the southwest. There is a surface water divide that trends northeast through the NCCA. Surface water should flow southeast to the Delaware River and northwest to the Christina River. The Christina is approximately 0.5 mile west of the AOI and 0.75 – 1.0 mile to the north of the AOI. The Delaware River is 0.5 mile from the southern boundary and less the 0.5 mile to the east of the AOI. There are four (4) marshes that encroach along the edges of the AOI. Army Creek is located along the southern extent. Narrow Dyke Canal and marsh is located on the southeastern edge just north of the Town of New Castle and Buttonwood

TABLE 5: SUMMARY OF GW ANALYTICAL FROM PUBLIC WELLS

Facility Name/Site	Well Number	DNREC Permit	Sample Date	PFOA ug/l	PFOS ug/l
Preliminary Health Advisory				0.4 ug/l	0.2 ug/l
Artesian Wells within AOI					
Airbase	Well-1	10029	8/6/2014	<0.04	<0.02
Airbase	Well-2	10030	8/28/2014	<0.02	<0.04
Airbase	Well-3	108453	8/28/2014	Not sampled	Not sampled
Airport Industrial	Well-1	48941	8/6/2014	0.08	<0.04
Airport Industrial	Well-2	52445	8/6/2014	0.07	0.05
Jefferson Farms	Well-1	237552	6/12/2014	0.05	0.20
Jefferson Farms	Well-1	237552	7/14/2014	0.07	0.36
Jefferson Farms	Well-1	237552	8/14/2014	0.08	0.59
Jefferson Farms	Well-2	241858	6/12/2014	0.05	<0.04
Jefferson Farms	Well-2	241858	7/14/2014	0.05	<0.04
Jefferson Farms	Well-2	241858	8/14/2014	0.04	<0.04
Jefferson Farms	Well-2	241858	9/1/2014	0.05	0.10
Castle Hills	Well-4	235992	8/6/2014	0.04	<0.04
Castle Hills	Well-4	235992	10/23/2014	0.05	<0.04
Castle Hills	Well-5	235991	8/6/2014	0.05	<0.04
Castle Hills	Well-5	235991	10/23/2014	0.06	<0.04
Wilmington Manor	Well-1	10039	7/1/2013	0.03	<0.04
Wilmington Manor	Well-1	10039	1/14/2014	0.03	<0.04
Wilmington Manor	Well-1	10039	10/15/2014	0.03	<0.04
Wilmington Manor	Well-3	10041	7/1/2013	0.14	0.93
Wilmington Manor	Well-3	10041	1/14/2014	0.14	1.80
City of New Castle Wells					
Frenchtown Road	Well-1	35665	7/9/2014	0.94	0.82
Schoolhouse Lane	Well-1	00137	7/9/2014	0.13	0.91
Basin Road	Well-1	10060	7/9/2014	0.44	2.30
Artesian Wells Outside AOI					
Llangollen (south)	Well-2	35081	9/4/2014	<0.02	<0.04
Llangollen (south)	Well-G3	10050	9/4/2014	0.11	<0.04
Llangollen (south)	Well-6	10051	9/4/2014	<0.02	<0.04
Llangollen (south)	Well-7	10049	9/4/2014	0.03	<0.04
Midvale (south)	Well-1	10037	8/6/2014	0.05	<0.04
Midvale (south)	Well-1	10037	10/23/2014	0.05	<0.04
Midvale (south)	Well-2	10038	8/6/2014	0.04	<0.04
Midvale (south)	Well-2	10038	10/23/2014	0.03	<0.04
Collins Park (northeast)	Well-1	10045	8/6/2014	0.05	<0.04
Collins Park (northeast)	Well-1	10045	10/23/2014	0.06	<0.04

Results colored in light grey are positive results below the preliminary health advisory. Results in yellow exceed the preliminary health advisory. *Offline* due to PFC Contamination

Table 6: SUMMARY OF GW ANALYTICAL FROM MONITOR WELLS

Facility Name/Site	Well Number	DNREC Permit	Sample Date	PFOA ug/l	PFOS ug/l
Preliminary Health Advisory				0.4 ug/l	0.2 ug/l
DeANG Wells					
DANG	MW-107	NA	8/13/2014	0.59	5.98
DANG	MWR-130S	95151	8/13/2014	0.19	2.00
DANG	MWR-145	NA	8/13/2014	0.42	2.10
DANG	MWR-147S	98527	8/13/2014	0.19	2.84
DANG	MW-316	NA	8/13/2014	0.45	7.90
DANG	MW-318	208357	8/13/2014	0.36	0.55
DANG	MW-405	008753?	8/13/2014	0.0092	0.013
DNREC Wells at NCC AIRPORT					
DNREC-SIRS	NCCAMW-01	240700	8/18/2014	0.0641	0.268
DNREC-SIRS	NCCAMW-02	240701	8/18/2014	0.0378J	0.0346J
DNREC-SIRS	NCCAMW-03	240702	8/18/2014	0.0203J	0.0427
DNREC-SIRS	NCCAMW-10	243551	8/18/2014	0.0183J	0.0782
DNREC-SIRS	NCCAMW-11	243552	8/18/2014	0.0167J	0.0813
Harry Wood Landfill					
AMOCO	MW-2	181215	9/30/2014	0.15	0.18
AMOCO	MW-3	181214	9/30/2014	0.071	0.04
AMOCO	MW-4S	235121	9/30/2014	0.13	0.36
AMOCO	MW-4D	235083	9/30/2014	0.076	0.34
AMOCO	MW-5	235084	10/1/2014	0.23	0.76